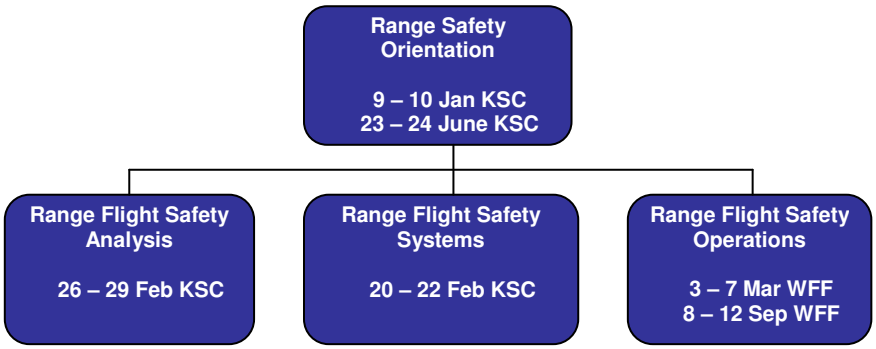
NASA Range Safety Training 2007

The NASA Range Safety Training program grew to full strength this year. Efforts that began in 2002 with a Phase 1 *Range Safety Orientation* course saw the completion of Phase 2 training development with the *Range Flight Safety Operations* course. These courses provide the training needs for range safety personnel and are applicable and available to NASA, the Department of Defense, and the Federal Aviation Administration as well as government support contractors. Courses are conducted at the NASA Safety Training Center and the Wallops Flight Facility. Although development is complete, we are always looking for inputs on updates for the course and potential instructors.

The development strategy originally put in place has served well in reaching critical milestones. An original steering group comprised of NASA, the Air Force, and the Federal Aviation Administration provided the foundation for the basic outlines of the courses.

Depending on the course content, the Range Safety Training Group had representatives from NASA Headquarters, Kennedy Space Center, Dryden Flight Research Center, Wallops Flight Facility, the 45th and 30th Space Wings, the Air Force Flight Test Center, the Federal Aviation Administration, the Missile Defense Agency, and members of the Range Safety Group of the Range Commanders Council.

To date, we've conducted 17 *Range Safety Orientation* courses with 464 students in attendance, four *Range Flight Safety Analysis* courses with 65 students in attendance, three *Range Flight Safety Systems* courses with 52 students, and one *Range Flight Safety Operations Course* with 6 students. The schedule for all courses for 2008 is shown below.



Range Safety Orientation

As you can see in the outline below, the *Range Safety Orientation* course is designed to give NASA senior, program, and project managers an understanding of the Range Safety mission, associated policies and requirements, and NASA roles and responsibilities. It introduces students to the major ranges and their capabilities and services, defines and discusses the major elements of Range Safety, and briefly addresses associated range safety topics such as ground safety, frequency management, and unmanned aerial vehicles.

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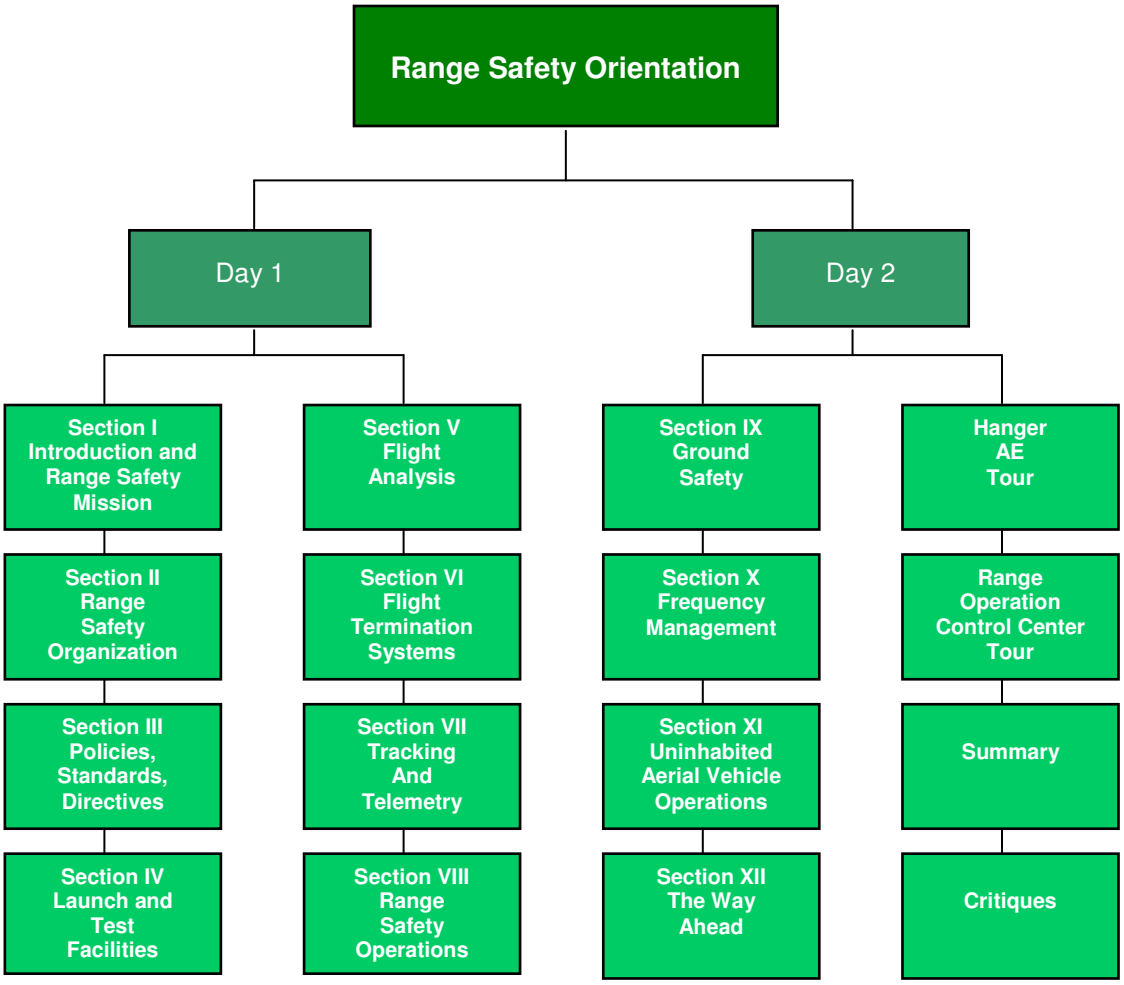
The course emphasizes the principles of safety risk management to ensure the public and NASA workforces are not subjected to risk of injury greater than their normal day-to-day activities. This course includes a visit to range safety facilities at Cape Canaveral Air Force Station and Kennedy Space Center and is normally only given at this location. If you wish to discuss presenting the class at your location, please contact the NASA Safety Training Center staff.

Target Audience: Senior, program, and project managers; Safety, Reliability, Quality, and Maintainability professionals with an interest in range safety activities



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Range Flight Safety Analysis

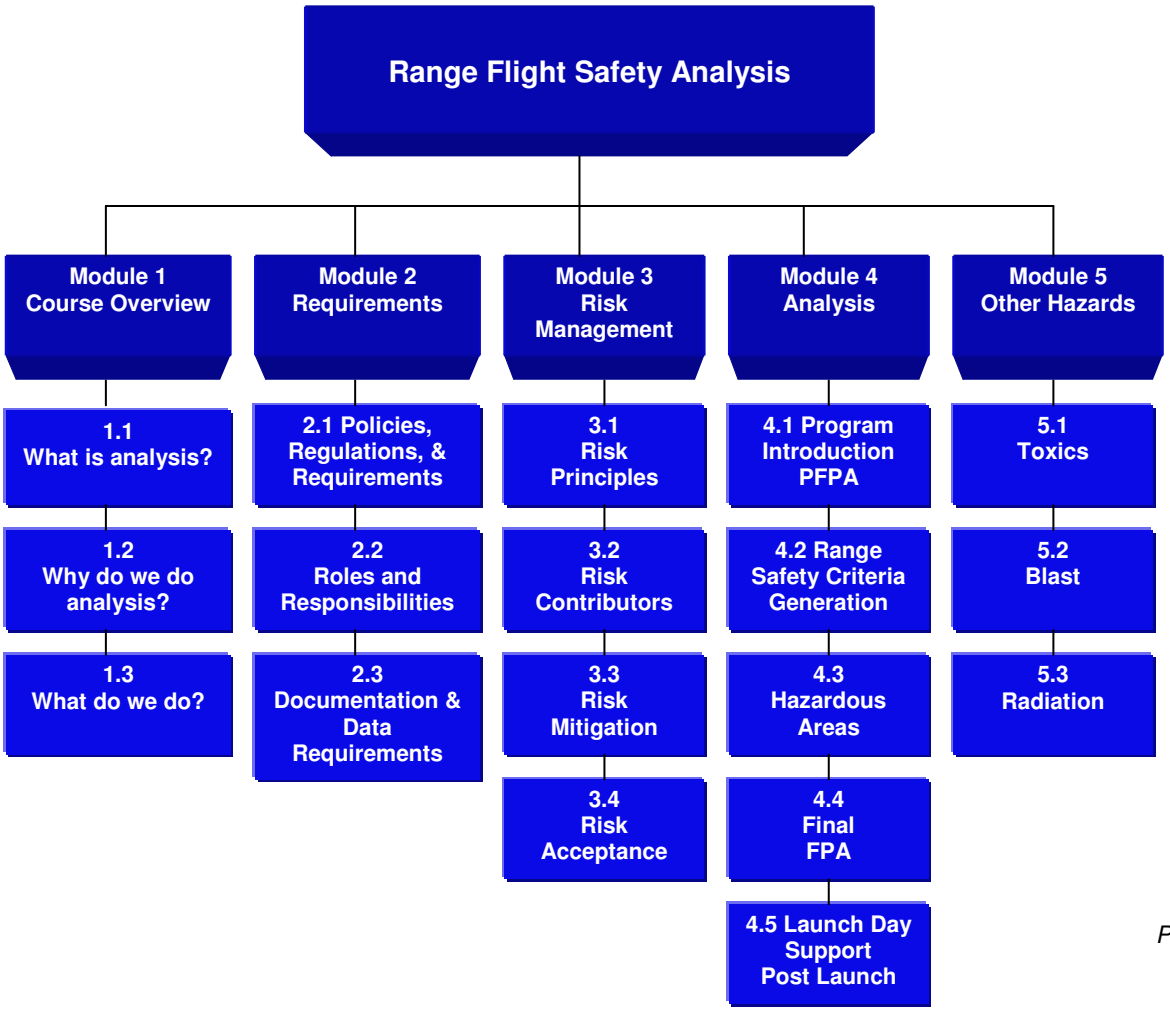
The *Range Flight Safety Analysis* course provides a detailed understanding of range safety analysis. It includes NASA, Federal Aviation Administration, and Department of Defense requirements for flight safety analysis; a discussion of range operations hazards, risk criteria, and risk management processes; and an in-depth coverage of the containment and risk management analyses performed for expendable launch vehicles at the Eastern Range.

Although the course is based on expendable launch vehicles at the Eastern Range, the overall analysis process and concepts are applicable to other vehicles and other ranges as well. The course concentrates on debris hazards and analyses but includes an overview of toxic, blast, and radiation analyses. The course includes a class exercise that covers the entire analysis process.

Prerequisite: NSTC 074, *Range Safety Orientation* or equivalent experience (engineering degree and a background in range safety)

Target Audience: NASA, Federal Aviation Administration, and Department of Defense Range Safety Analysts; range safety personnel in other disciplines; and program/project managers and engineers who design potentially hazardous systems to operate on a range

The *Range Flight Safety Analysis* course outline is shown in the graphic below.



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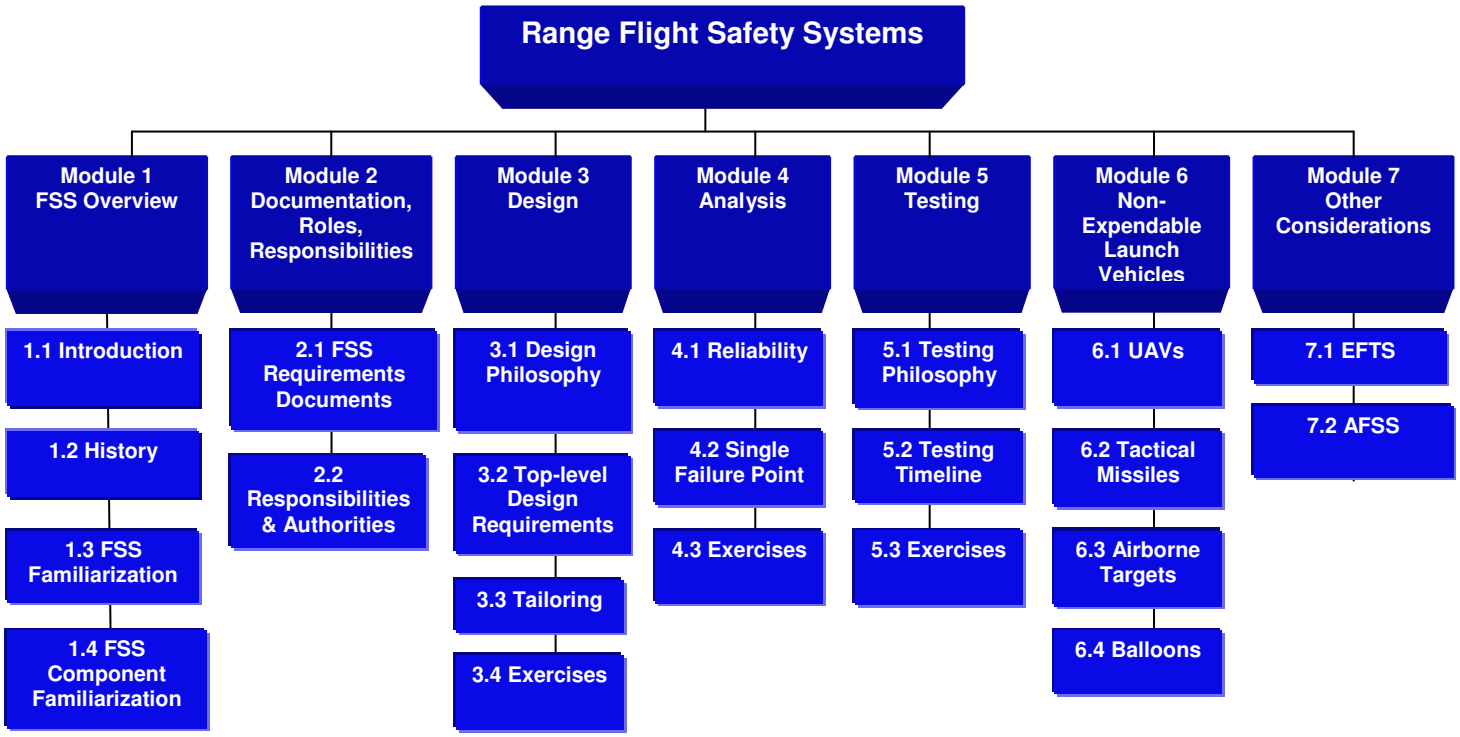
Range Flight Safety Systems

The *Range Flight Safety Systems* course was taught for the first time at Kennedy Space Center in September of 2007 with 15 students in attendance. The course size is limited by tours we conduct at the Navy Trident trainer facility. The course describes required safety responsibilities and flight termination system procedures and plans. It also includes flight termination system component design, performance, test, and subsystem pre-launch requirements.

The module then transitions to the applicable flight termination system ground support and monitoring equipment, flight termination system analysis, and component test history. The course continues with a review of unmanned aerial vehicle flight termination systems, balloon universal termination packages, and the enhanced flight termination system. The class ends with a description of the autonomous flight safety system.

Prerequisites: NSTC 074, *Range Safety Orientation* or equivalent level of experience or training, is required; NSTC 002, *System Safety Fundamentals* or NSTC 008, *System Safety Workshop*, is recommended

Target Audience: NASA, Federal Aviation Administration, and Department of Defense Range Safety Personnel working Flight Safety Systems issues; range safety personnel in other disciplines; program/project managers and engineers who design potentially hazardous systems to operate on a range; personnel who conduct hazardous operations on a range.



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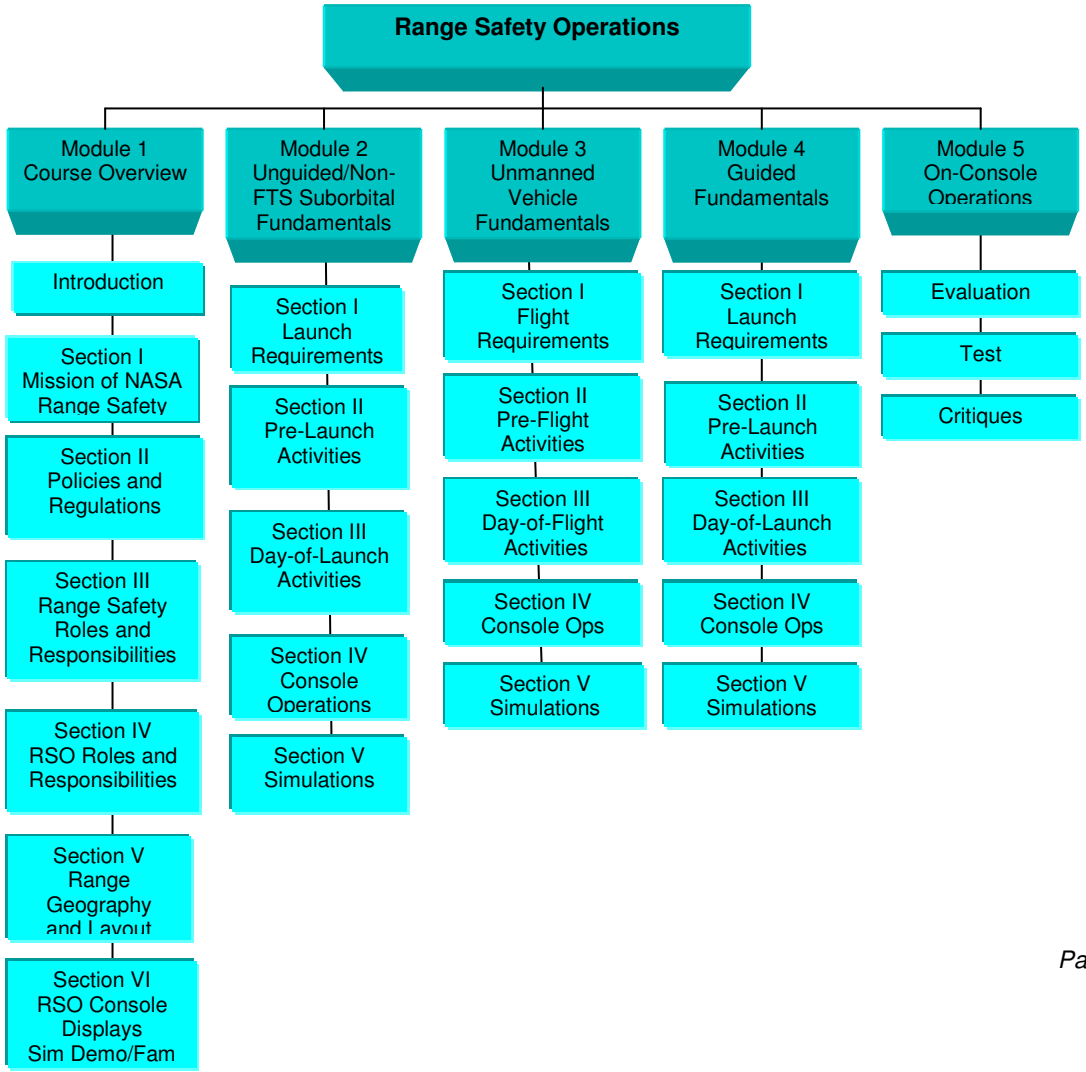
Range Flight Safety Operations Course

The *Range Flight Safety Operations* course was completed in early 2007 and the pilot course conducted in February with representatives from NASA Headquarters, Kennedy Space Center, Wallops Flight Facility, Dryden Flight Research Center, and Federal Aviation Administration in attendance. The first official course was held in July 2007. Unlike previous courses, this course is only taught at Wallops Flight Facility to take advantage of its range safety and control room facilities, as well as the mobile range safety system assets.

To ensure mission success and the safety of operations for the range, a formal process has evolved among the different ranges to provide range safety operations. As you can see from the outline below, this course focuses on the roles and responsibilities of the Range Safety Officer for range safety operations, as well as real-time support, including pre-launch, launch, flight, landing, and required mitigation actions. Launch commit criteria, mission rules, countdown activities, and display techniques are presented.

Tracking and telemetry, post operations, lessons learned, and the use and importance of contingency plans are discussed. Those participating in the course receive hands-on simulator training and exercises to reinforce techniques and procedures to successfully conduct launch operations. Due to the unique interaction with real-world equipment, a maximum of six students may attend each class. The course centers on the topics shown in the graphic below.



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If you wish to attend any of the courses offered, please contact your Center training manager, or refer to the NSTC web site course catalogue located at:
http://www6.jsc.nasa.gov/safety/calendar/NSTC/Docs/2008_Catalog.doc